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Logan County Test Hole Logs

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LOGAN COUNTY
Test-Hole Logs

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Nebraska Water Survey
Test-Hole Report No. 57

Conservation and Survey Division
Institute of Agriculture and Natural Resources
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Publication and price lists are furnished upon request.

April 2001

ACKNOWLEDGMENTS

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INTRODUCTION

In 1930, the Conservation and Survey Division of the University of Nebraska and the U.S. Geological Survey began a program of cooperative groundwater studies in Nebraska. Since then test drilling by use of rotary drilling equipment has been an integral part of that program. This report contains logs of all the test holes drilled in the county under the program as well as those drilled by the Conservation and Survey Division with financial assistance from other government agencies.

The map in this report shows the location of all test holes drilled in the county since 1931 (Figure 1).

Present techniques of test-hole logging and sampling include use of drilling mud suitable to drilling conditions, timing by stopwatch of the drilling of each 5-foot increment of depth, and removal of all cuttings from the test hole at intervals of 5 feet or less. During the drilling of the hole, cuttings from each interval are examined immediately; samples representing each 5-foot interval and each recognizable change in material are retained. After samples are washed, they are described lithologically and the color is evaluated by comparison with standard color charts. The samples then are dried, stored, and cataloged. All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588-0517.

Beginning in September 1951, some of the test holes have been logged electrically. Geophysical logs (e-logs) often can be used to determine formation boundaries more precisely than by field sampling, especially where differences in rock types occur at the boundary from one formation to another. Figure 2 is an example of a geophysical log from Logan County (test hole #16-B-70) with formation boundaries shown. A notation on each test hole log indicates if geophysical logs are part of the original test hole data on file in the CSD office in Lincoln.

This publication is one of a series being issued to make more readily available the record of test holes drilled since 1930. The series of publications is made on a county basis and includes, with some exceptions, logs of all test holes drilled in each of the counties. The logs have not been reviewed for conformance with editorial standards and nomenclature. In the case of Logan County, descriptions of the strata done in earlier test hole reports as well as formation names have been revised where necessary in this report.

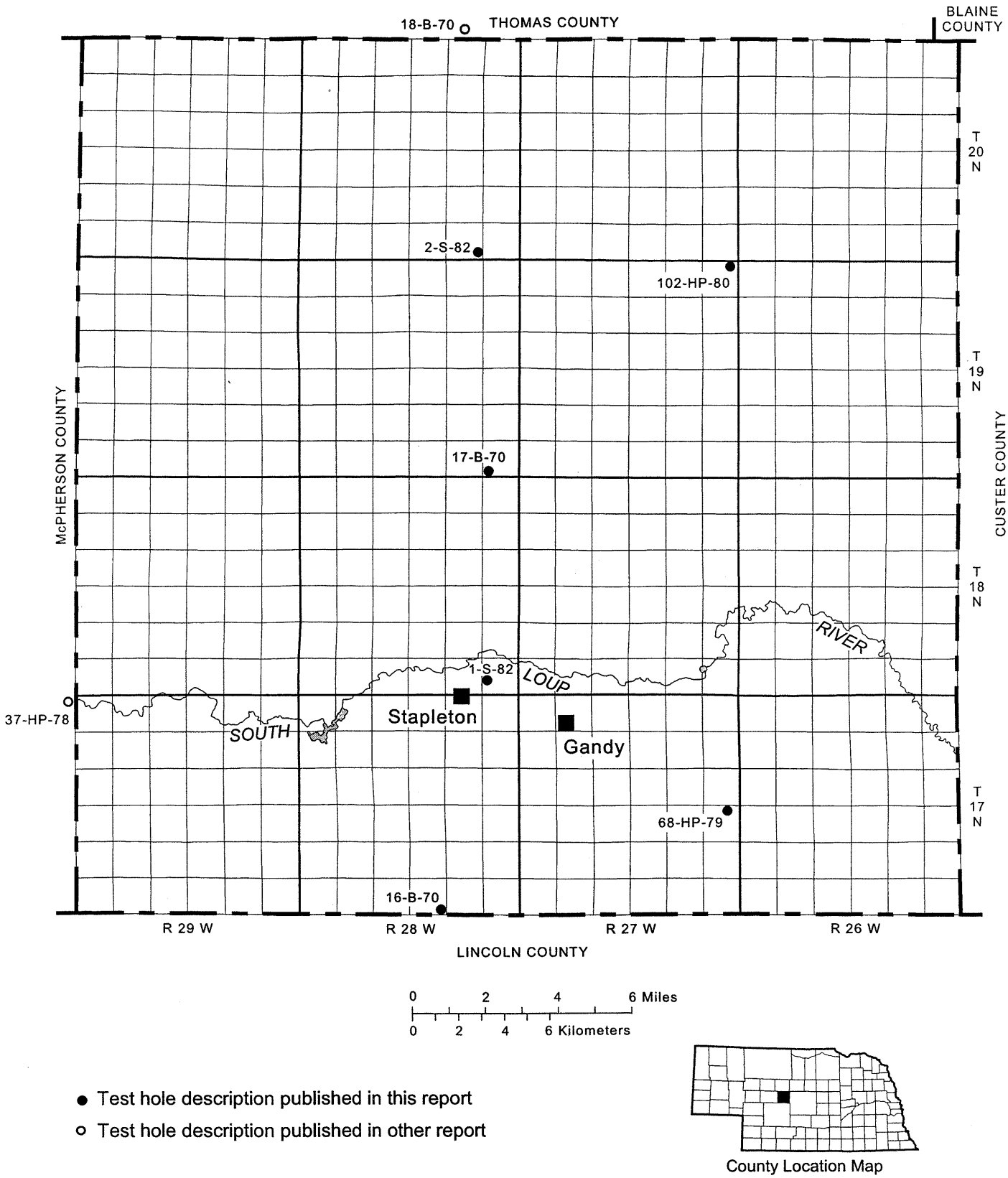


Figure 1. Test-hole location map of Logan County.

Figure 2. Logan County sample geophysical log (16-B-70)

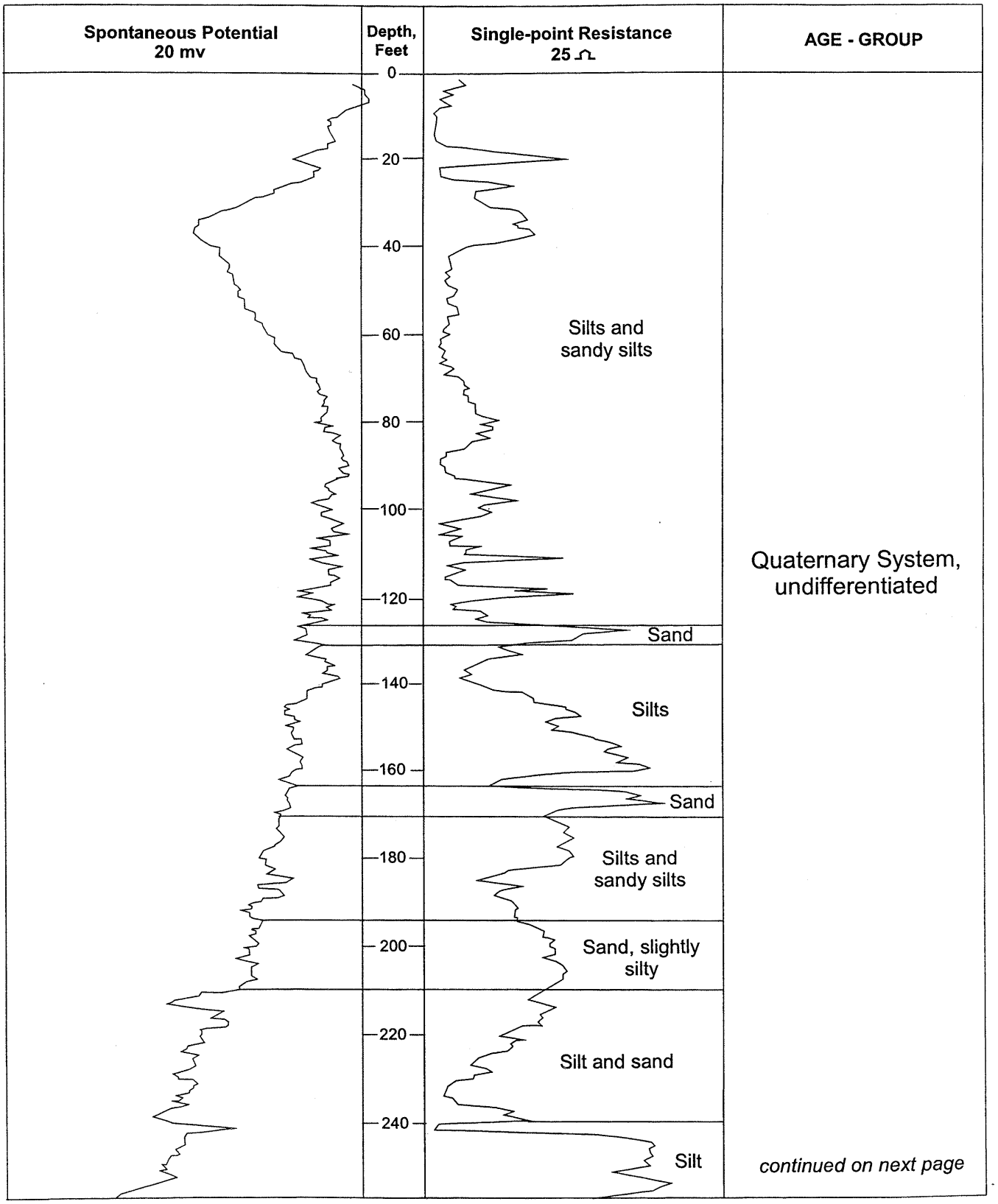


Figure 2 continued. Logan County sample geophysical log (16-B-70)

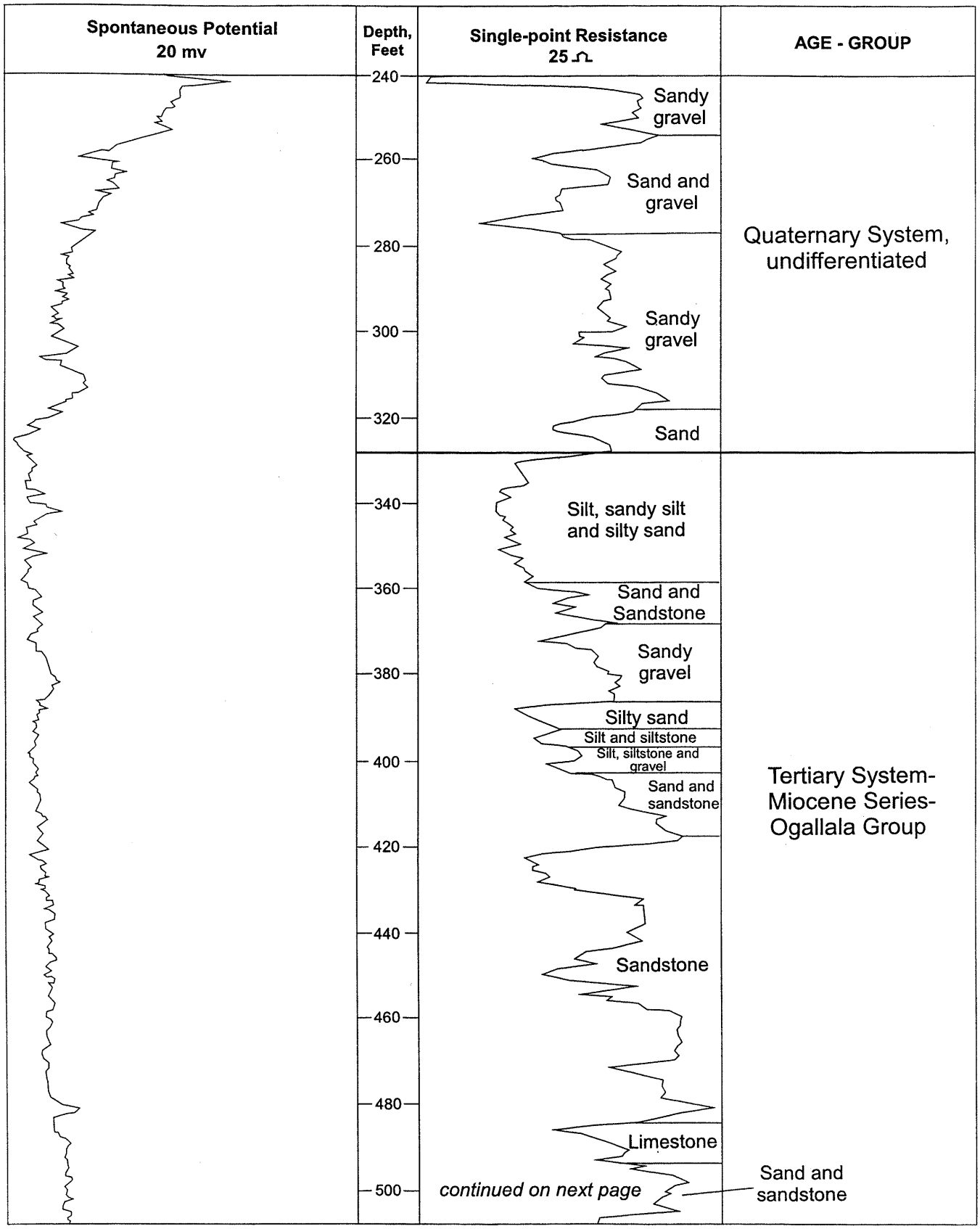
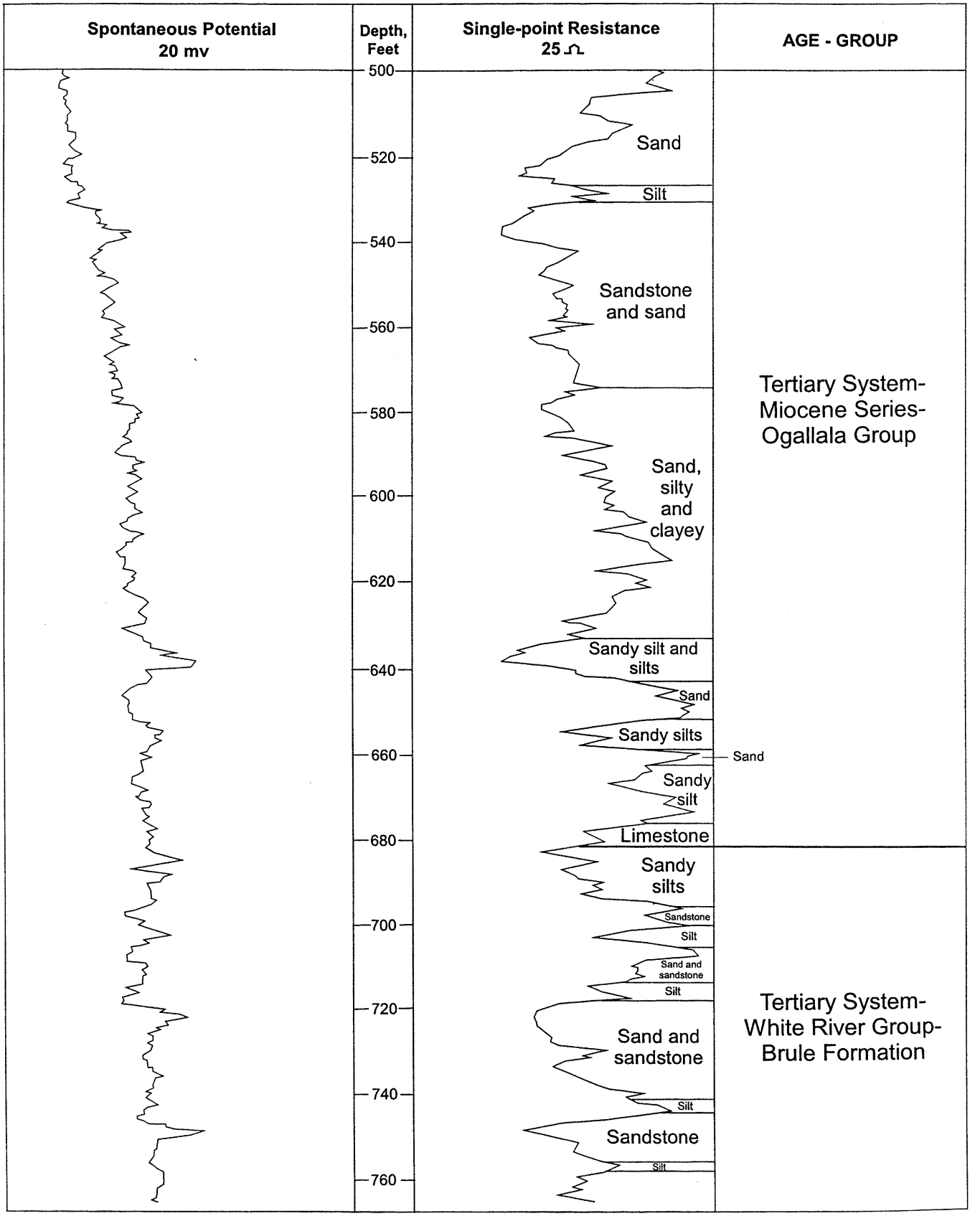


Figure 2 continued. Logan County sample geophysical log (16-B-70)



The method whereby the altitude of the land surface at test hole sites was determined is indicated in the heading of each log, as follows: a = altimeter, h = hand leveling, i = spirit leveling, t = estimated from topographic map. For each test hole log, the name of the 7.5 minute USGS topographic map on which the hole is located is also included in the heading.

The test-hole records accurately reflect subsurface conditions only at the locations where the test holes were drilled. Interpretive data reflecting probable subsurface conditions between test-holes are being compiled for publication in county reports and are available for inspection in the office of the Conservation and Survey Division.

Each test hole is identified by a number assigned in the field (for example #3-B-67, #41-79), and most are also identified by a number indicating their location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska. Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter. The first numeral indicates the township, the second the range, and the third the section. As shown in figure 3, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section and so on to the quarter-quarter-quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. The last numeral is the serial number of the test hole within the quarter-quarter-quarter-quarter section and is only utilized if more than one test hole is present in that area. This system of identification is also utilized by the USGS.

Another way of indicating a legal location for a test-hole is shown on figure 3. For example, 5N-4E-15CADC, could also be described as SW SE NE SW Section 15, T 5N, R4E; that is, the test hole is located in the Southwest quarter of the Southeast quarter of the Northeast quarter of the Southwest quarter of Section 15, Township 5 North, Range 4 East. This method to describe the subdivision of a section is used by most other people and agencies, including the CSD. Both methods are shown in Figure 3.

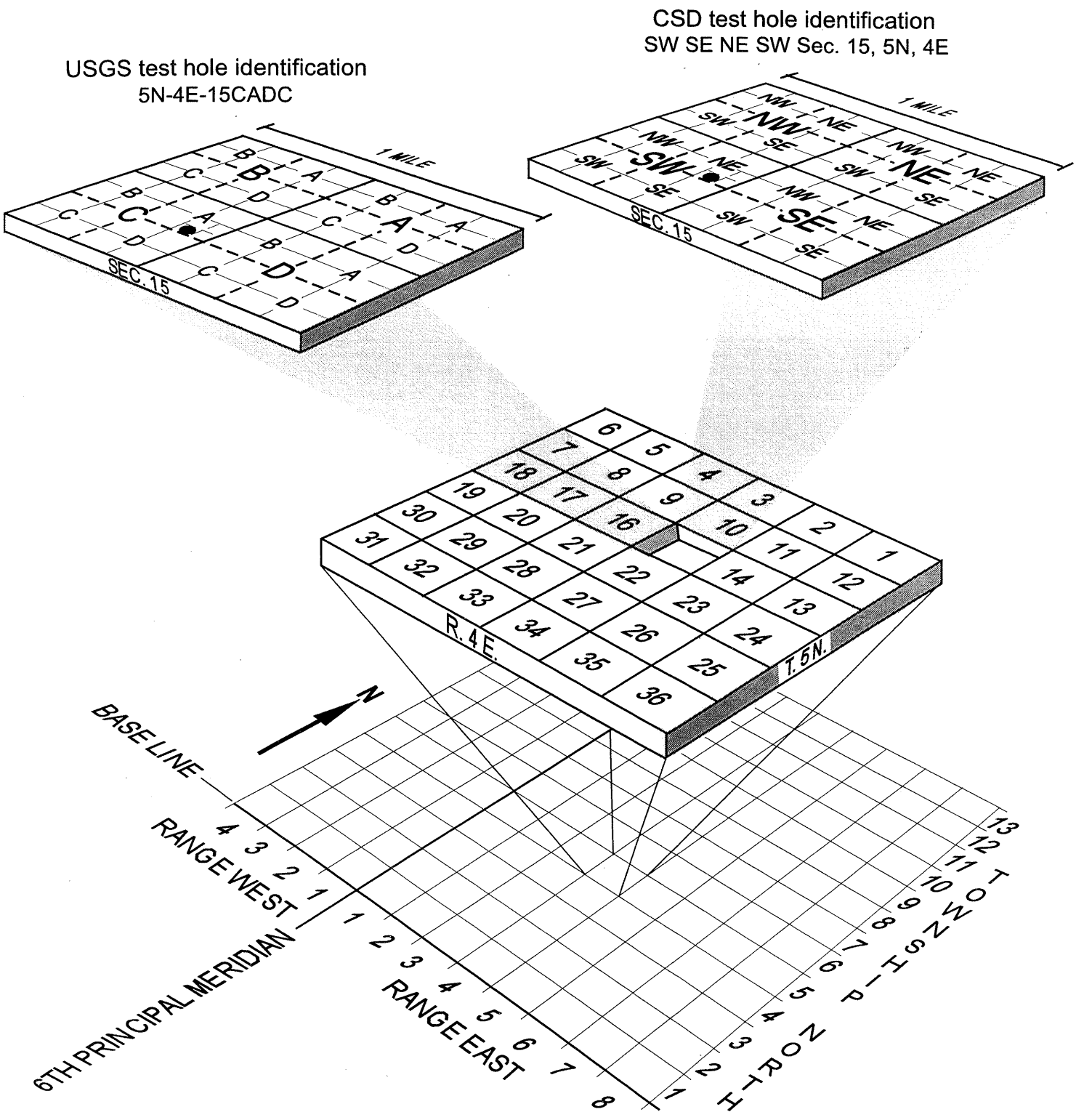


Fig. 3. System for identifying test-hole according to its location.

SELECTED REFERENCES

A few of the most recently published groundwater resources of Logan County are included below. The interested reader may find citations to earlier published studies noted in these references:

May, D., Swinehart, J.B., Loope, D., and Souders, V., 1995, Late Quaternary fluvial and eolian sediments: Loup River Basin and the Nebraska Sand Hills in Diffendal, R.F., Jr., chair, and Flowerday, C.A., ed., Geologic field trips in Nebraska and adjacent parts of Kansas and South Dakota, parts of the 29th Annual meetings of the north-central and south-central sections, Geological Society of America: University of Nebraska Conservation and Survey Division Guidebook 10, p. 13-31.

Sniegocki, R.T., 1959, Geologic and ground-water reconnaissance of the Loup River drainage basin, Nebraska: U.S. Geological Survey Water Supply Paper 1493, 106 p.

Souders, V.L., Preliminary Bedrock maps and cross sections showing configurations of bedrock surfaces, Broken Bow 1° x 2° quadrangle, Nebraska, U.S. Geological Survey Investigations Series (In press).

Swinehart, J.B., and Diffendal, R.F., Jr., 1989, Geology of the pre-dune strata, in Bleed, A.S., and Flowerday, C.A., eds., An atlas of the Sand Hills: University of Nebraska Conservation and Survey Division Resource Atlas 5, p. 29-42.

Logan County
Test-Hole Table of Contents

Test-holes are arranged in this publication by township, range and section.

Logan County
Test-Hole Table of Contents

Arranged by year drilled, test-hole number.

Test Hole #68-HP-79 (E-log)
(17N-27W-24abaa)
Logan County

Location: NE NE NW NE, sec. 24, T. 17 N., R. 27 W., approximately 188 ft south and 1400 ft west of northeast corner of section.
Ground elevation: 2908 ft (t). (Logan 7.5 minute quadrangle).
Depth to water: Not recorded.
Note: There are no samples from 0 to 430 ft. In this interval all descriptions are summarized from the field descriptions.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine, dark gray to pale brown and pale yellow, slightly silty below 5 ft, variably clayey below 5 ft	0.0	25.0
Silt, pale olive, slightly to very sandy, very fine to fine; some pale yellow, some iron stains	25.0	55.0
Sand, very fine to medium, moderately silty with layers of clayey silt, pale yellow to very pale brown	55.0	60.0
Silt, slightly clayey, slightly to moderately sandy, pale yellow with some iron oxide stains	60.0	90.0
Silt, very sandy and sand, very silty, very fine to medium sand, pale yellow	90.0	170.0
Gravel, fine to medium and sand, medium to very coarse with clayey silt layers, pale yellow	170.0	195.0
Silt, pale olive, slightly sandy, slightly clayey	195.0	200.0
Silt, pale olive, changing to sand, very fine to very coarse, mostly medium to coarse	200.0	205.0
Sand, very fine to coarse, mostly fine to medium, slightly silty, pale yellow, traces of very coarse sand, below 210 ft very coarse sand increases and there are traces of fine gravel	205.0	220.0
Gravel, fine to medium and sand, very fine to very coarse, mostly coarse to very coarse, pale olive	220.0	246.0
Silt, pale olive and light yellowish brown, moderately sandy, slightly clayey	246.0	267.0
Sand, very fine to very coarse, mostly coarse to very coarse and gravel, fine	267.0	270.0
Gravel, fine to medium and sand, very fine to very coarse, mostly very coarse	270.0	276.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey, pale yellow and pale brown	276.0	280.0
Silt, white, very calcareous, moderately clayey, includes pale olive sandy silt and white clayey layers below 285 ft	280.0	295.0
Siltstone, pale yellow, moderately clayey with pale brown sandstone and white clay	295.0	300.0

Sandstone, pale olive, very fine to fine with some sandy silt and white clay; contains silicified rootlets	300.0	310.0
Silt, very pale brown, moderately sandy with sandstone fragments and white clay	310.0	315.0
Sandstone, very fine to medium and sand, very fine to medium; contains abundant silicified rootlets, lime cement between 320 and 325 ft and 330 to 335 ft	315.0	340.0
Sandstone and sand, very fine to fine and sandy silt, pale yellow, contains silicified rootlets; contains lime cement from 345 to 350 ft; contains white clay from 380 to 395 ft	340.0	395.0
Silt, pale yellow and clay, white, moderately sandy with sandstone fragments	395.0	400.0
Sandstone and sand, olive yellow, very fine to medium with clay, white	400.0	415.0
Silt, pale yellow and clay, white with fragments of limestone and pale olive sandstone	415.0	425.0
Sandstone, very fine to medium, pale yellow, very calcareous; contains sandy silt; contains rootlets	425.0	445.0
Sandstone, very fine to medium, light gray to pale yellow, very calcareous, contains limestone lenses	445.0	450.0
Silt, pale yellow, moderately sandy with white clay and sand to sandstone fragments; slightly to very calcareous	450.0	503.0
Silt and clay, slightly to very sandy with very fine to fine sand, pale yellow to very pale brown, slightly calcareous	503.0	550.0
Sand, very fine to medium, with layers of silty clay, pale yellow with traces of dark silicates, very calcareous	550.0	565.0
Silt, sandy, pale yellow to light gray with some white clay, sand was fine to very fine, very calcareous	565.0	580.0
Sandstone, very fine to medium with silt layers, pale yellow; contains rootlets; some pale olive colors, clayey in some samples	580.0	600.0
Sand to sandstone silty, slightly clayey, poorly consolidated, slightly calcareous, pale yellow to light olive, sand is very fine to medium grained, increased silt below 615 ft	600.0	630.0
Silt, moderately sandy, very fine to fine, with some sandstone and clay, very calcareous, pale yellow to pale olive	630.0	645.0
Sandstone, very fine to medium with layers of silt; traces of white clay, very calcareous, pale yellow to light gray	645.0	685.0

Silt and siltstone, slightly sandy, very fine to fine sand, traces of sandstone, pale yellow to light gray, slightly calcareous.....	685.0	700.0
Silt, slightly sandy, slightly clayey, very fine to fine, pale yellow to very pale brown, very calcareous.....	700.0	715.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, and silt, moderately clayey, pale brown to reddish brown.....	715.0	740.0

Test Hole #16-B-70 (E-log)
(17N-28W-34ddda)
Logan County

Location: NE SE SE SE sec. 34, T. 17 N., R. 28 W., 600 ft north and 6 ft west of southeast corner.
Ground elevation: 3055 (t). (Stapleton 7.5 minute quadrangle).
Depth to water: 24 ft (estimated).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil; silt, slightly sandy, very dark grayish brown, slightly lighter in lower 2 ft	0.0	4.5
Silt, slightly sandy, grayish brown with very fine sand	4.5	5.0
Silt, slightly sandy, pale brown to very pale brown, very fine sand	5.0	18.0
Sand, very fine to fine, yellowish brown with darker grains, trace of medium sand	18.0	20.0
Silt, slightly clayey, very fine sand, yellowish brown, some iron stain, becomes pale yellow to very pale brown in lower 3 ft	20.0	24.0
Sand, very fine sand, very slightly silty, pale yellow with gray to black grains	24.0	38.0
Silt, slightly sandy, very pale brown, very fine sand	38.0	45.5
Silt, slightly sandy, yellowish brown to pale brown, very fine sand, some dark stain 50 to 60 ft	45.5	63.5
Silt, slightly sandy, very pale brown, very fine sand, calcareous areas	63.5	70.0
Silt, slightly sandy, very pale brown, very fine sand	70.0	89.0
Silt, slightly sandy, light gray, very fine sand	89.0	91.5
Silt, slightly sandy, greenish gray, very fine to fine sand	91.5	125.0
Sand, very fine to fine with trace of medium, yellowish brown	125.0	130.3
Silt, slightly clayey, moderately sandy, light gray to greenish gray, very fine sand	130.3	145.0
Sand, moderately silty, very fine to fine with trace of medium grains, very pale brown with scattered dark grains	145.0	162.0
Silt, slightly clayey, very sandy, light olive gray, sand is very fine to fine	162.0	163.3
Sand, slightly silty, very fine to fine, very pale brown with scattered dark grains	163.3	182.0
Silt, slightly clayey, very sandy, pale yellow, very fine grained sand; calcareous	182.0	185.0
Sand, slightly silty, very fine to fine grained; very pale brown with scattered darker grains	185.0	188.0

Silt, slightly clayey, very sandy, light gray, calcareous	188.0	192.9
Sand, slightly silty, very fine to fine with trace of medium, very pale brown with scattered darker grains, contain a few calcareous grains	192.9	225.0
Sand, very silty, to silt, very sandy, pale yellow, very fine to fine sand	225.0	230.0
Silt, slightly clayey, moderately sandy, pale yellow, very fine sand, very calcareous	230.0	236.0
Sand, slightly silty, very fine to fine grained, pale yellow	236.0	240.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine grained	240.0	242.0
Sand, very fine to medium with scattered coarse to very coarse grains, pale yellow with some olive grains	242.0	245.0
Gravel, fine to medium, sandy with very fine to coarse sand, pale yellow with olive, light gray and pink grains; gravel more than 70 percent, coarsens downward	245.0	270.0
Sand, gravelly, very fine sand to fine gravel with about 60 percent sand, pale yellow with olive and pink grains; silt layer from 273 to 274.5 ft	270.0	275.0
Gravel, sandy, gravel is fine, sand is very fine to coarse; more than 60 percent gravel; pale yellow with olive and pink grains, gravel decreases to about 30 percent below 280 ft; 65 to 70 percent gravel below 285 ft	275.0	325.0
Sand, gravelly, very fine sand to fine gravel with 35 percent gravel; pink with pale yellow and olive grains	325.0	330.0
Tertiary System - Miocene Series - Ogallala Group:		
Silty sand to sandy silt, pale yellow to very pale brown, very fine to fine sand, some sandstone in lower part	330.0	338.5
Silt, slightly clayey, very sandy, pale yellow, very fine to fine sand, few rootlets below 350 ft	338.5	355.0
Sand and sandstone, poorly cemented, very fine to coarse; pale yellow with scattered dark and fine grains, below 370 ft becomes fine to coarse	355.0	375.0
Gravel, fine, sandy with fine to medium sand, grayish green with scattered darker and pink grains	375.0	385.0
Sand, silty to very silty, pale yellow with cream, pink and olive grains, sand is very fine to medium with sparse coarse	385.0	388.0
Silt and siltstone, very sandy, very pale brown, sand is very fine to fine grained	388.0	390.0
Silt, siltstone and gravel, slightly clayey, very sandy, very pale brown with olive and pink grains, sand is very fine to fine, gravel is fine	390.0	400.0

Sand, gravelly, sand is very fine to fine, gravel is fine, pale yellow with gray, pink and cream grains, minor interbedded silt.....	400.0	405.0
Sand and sandstone, gravelly, pale yellow with dark grains, sand very fine to fine, gravel fine with trace of medium.....	405.0	410.0
Sand and sandstone, gravelly, pale yellow with olive and pink grains, sandstone has cream colored calcareous cement (calcrete), sand is very fine to medium, gravel is fine.....	410.0	440.0
Sand, very fine to fine with some medium, pale yellow with abundant dark silicate materials.....	440.0	445.0
Sand and sandstone, very fine to fine with some medium, some darker silicate minerals, sandstone is cemented with cream colored calcareous cement (calcrete).....	445.0	450.0
Sandstone, silty and clayey, light gray, sand is very fine to fine grained, calcareous cement (calcrete).....	450.0	455.0
Sand, slightly silty, pale yellow; sand is very fine to fine grained.....	455.0	460.0
Silt, sandy, pale yellow, rootlets.....	460.0	465.0
Sand, pale yellow with dark specks, very fine to fine grained, few medium grains.....	465.0	481.0
Limestone, light gray, very sandy with very fine to medium sand.....	481.0	495.0
Sand, silty and silt, sandy with limestone lenses and calcrete, pale yellow.....	495.0	500.0
Sand, very fine to fine with trace of medium, pale yellow with traces of darker silicate grains.....	500.0	525.0
Silt, clayey, slightly sandy, very calcareous, pale yellow to very pale brown, volcanic ash in 530 to 540 ft interval.....	525.0	535.0
Sandstone, very fine to fine, pale yellow with trace of dark silicates, slightly calcareous.....	535.0	570.0
Sand, silty, very fine to medium, pale yellow with slight olive tint, some darker silicate grains....	570.0	575.0
Sand, very fine to fine with trace of medium, pale yellow with traces of brown, dark gray and black silicates.....	575.0	585.0
Sand, silty to silt, sandy, clayey, very fine to fine, pale yellow, rootlets, trace of volcanic ash.....	585.0	595.0
Sand, very fine to fine with traces of medium, pale yellow with scattered darker silicate grains; medium grains below 625 ft.....	595.0	630.0
Sand, clayey and silty, fine to coarse and gravel, fine, pale yellow with pink and olive grains, very slightly calcareous.....	630.0	635.0
Silt, sandy to sand, silty, very fine to fine, pale yellow, trace of sandstone with calcareous cement.	635.0	650.0

Sand, very fine to medium, some sandstone, pale yellow with scattered light olive grains, very calcareous	650.0	660.0
Silt, sandy with very fine to fine sand, pale yellow, very calcareous	660.0	665.0
Limestone, very sandy, light gray, sand is very fine to fine	665.0	685.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt, sandy with very fine to fine sand, light gray to pale yellow, very calcareous	685.0	700.0
Sand and sandstone, very calcareous, very fine to fine gravel, pale yellow with traces of dark silicates	700.0	703.8
Silt, moderately sandy, very fine to fine sand, calcareous, light gray to pale yellow	703.8	710.0
Sand and sandstone, very fine to fine with calcareous cement, pale yellow with some light olive	710.0	720.0
Silt, moderately sandy with very fine to fine sand, pale yellow, very calcareous	720.0	725.0
Sand and sandstone, silty, sand is very fine to fine with trace of medium, pale yellow, calcareous	725.0	735.0
Sandstone, very fine to fine grained, light gray to pale yellow, calcareous cement	735.0	740.0
Silt, very sandy with very fine to fine sand, pale yellow, moderately calcareous	740.0	745.0
Sandstone, very fine to fine grained, light gray to very pale brown, very calcareous	745.0	755.0
Silt, very sandy with very fine to fine sand, pale yellow, moderately calcareous	755.0	765.0

Test Hole #1-S-82 (E-log)
(18N-28W-36cbcc)
Logan County

Location: SW SW NW SW sec. 36, T. 18 N., R. 28 W., 1620 ft north and 131 ft east of southwest corner.
Ground elevation: 2890 ft (t). (Stapleton 7.5 minute quadrangle).
Depth to water: Not recorded.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, slightly silty, trace of coarse sand, very pale brown with a trace of dark silicates, moderately clayey 10 to 15 ft; below 40 ft sand is very fine to medium.....	0.0	50.0
Sand, very fine to medium, very pale brown with thin lenses of pale yellow siltstone at 50 to 55 ft, slightly silty 60 to 65 ft and 70 to 75 ft.....	50.0	75.0
Sand, medium to very coarse, silty, very pale brown with traces of dark silicates, silt is light olive gray.....	75.0	95.0
Sand, very fine to medium, slightly silty, very pale brown with traces of dark silicates.....	95.0	100.0
Sand, very fine to very coarse, mostly medium to coarse, slightly silty, very pale brown with some pale yellow and traces of dark silicates, very slightly calcareous; 105 to 110 ft mostly coarse to very coarse with fine gravel, electric log shows silt layer from 110 to 115 ft.....	100.0	150.0
Sand, fine to very coarse and gravel, fine to medium, mostly fine, pale yellow with pink and dark silicate grains.....	150.0	162.0
Silt, slightly clayey, light olive gray.....	162.0	165.0
Sand, very fine to coarse, mostly fine to medium, trace of very coarse sand and fine gravel, pale yellow with traces of pink, pale olive, and dark silicates, traces of pale yellow silt below 175 ft; some medium gravel below 205 ft.....	165.0	208.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand and sandstone, very fine to medium, light olive gray with trace of dark silicates; poorly consolidated, trace of silicified rootlets, some light olive clayey silt below 210 ft, calcareous cement below 219 ft; some seeds below 230 ft.....	208.0	250.0
Sandstone, slightly silty, very fine to fine, lime cement, pale yellow to light gray, silicified rootlets.....	250.0	260.0

Sand and sandstone, very fine to fine, pale yellow interbedded with white calcareous siltstone; silicified rootlets decrease in sandstone downward; only traces of sandstone below 290 ft; from 315 to 320 ft lime cemented sandstone is dominant; 328 to 322 ft electric log shows silty layer, 345 to 355 ft mostly lime cemented sandstone.....	260.0	360.0
Sand, very fine to medium with small amount of lime cemented sandstone, pale yellow; rare pale yellow siltstone; siltstone increases from 383 to 393 ft.	360.0	410.0
Sandstone and sand, very fine to coarse, mostly medium, pale yellow to light olive gray with dark silicates, few silicified rootlets, below 420 ft mostly sand.....	410.0	447.0
Siltstone, pale yellow to light olive, depth adjusted from electric log.....	447.0	450.0
Sand, very fine to medium, mostly fine, some siltstone, pale yellow to light olive, traces of silicified rootlets.....	450.0	463.0
Siltstone, pale yellow to pale olive and pale brown and sand, very fine to medium, depth adjusted from electric log.....	463.0	469.0
Sand, very fine to medium and siltstone, pale yellow to pale olive, depth adjusted from electric log...	469.0	477.0
Siltstone, pale yellow to pale olive, calcareous....	477.0	480.0
Sand, very fine to medium, pale yellow, some calcareous cement and/or limy beds, zones of pale olive siltstone; increased amount of siltstone 515 to 520 ft; coarser sand 525 to 530 ft, hard limestone lens at 553 ft.....	480.0	560.0
Sandstone, very fine to fine, clayey, lime cemented and pale yellow to white with pale olive siltstone fragments, some interbedded light gray limestone, trace of rootlets.....	560.0	620.0
Siltstone to claystone, moderately clayey to very sandy, fine to medium sand, very pale olive to light gray, very calcareous.....	620.0	655.0
Sand to sandstone, very fine to fine, pale yellow to pale olive, very calcareous, may be some interbedded sandy limestone.....	655.0	690.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, slightly sandy, very fine sand, pale yellow, moderately calcareous, traces of reddish brown and pink, some claystone below 705 ft.....	690.0	735.0
Siltstone, slightly to moderately clayey, sandy, light brown, very slightly calcareous.....	735.0	760.0

Test Hole #102-HP-80 (E-log)
(19N-27W-1aaab)
Logan County

Location: NW NE NE NE sec. 1, T. 19 N., R. 27 W., 20 ft south and 360 ft west of northeast corner of section.
Ground elevation: 2905 ft (t). (Hoagland NE 7.5 min. quadrangle).
Depth to water: Not recorded.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, moderately silty and clayey, very fine to fine, dark grayish brown	0.0	10.0
Clay, silty and slightly sandy, very fine, black to dark gray	10.0	20.0
Sand, very fine to medium with rare coarse to very coarse, pale yellow with scattered dark silicate grains	20.0	25.0
Silt, moderately sandy, pale yellow, sand is very fine to fine	25.0	40.0
Silt, very sandy, very fine to medium, pale yellow; moderately sandy 45 to 60 ft, slightly sandy 65 to 70 ft	40.0	80.0
Sand, very fine to fine, very silty, pale yellow	80.0	85.0
Silt, pale yellow, moderately to very sandy, very fine to fine with trace of medium to coarse	85.0	100.0
Silt, pale brown to very pale brown with streaks of gray, moderately sandy, very fine to fine, slightly clayey	100.0	140.0
Sand, very silty, very fine to fine, very pale brown with streaks of gray	140.0	145.0
Silt, very sandy, very fine to fine, very pale brown, trace of gray silicified rootlets 145 to 150 ft	145.0	160.0
Sand, very fine to medium with trace of coarse, very silty, very pale brown; trace of fine gravel below 170 ft	160.0	178.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand and gravel, sand is fine to coarse, mostly medium to coarse, gravel is fine, pale yellow with grains of pale olive and pink; slightly silty; silicified rootlets	178.0	200.0
Sandstone, very fine to fine, moderately silty, trace of rootlets, possible seed fragments, light brownish gray	200.0	205.0
Siltstone, very sandy, very fine to medium, trace of rootlets, pale yellow to pale olive	205.0	220.0
Sandstone, very fine to medium, very silty, trace of rootlets, pale olive, lime cemented below 225 ft	220.0	242.0
Silt, very clayey, white	242.0	245.0

Sandstone, moderately to very silty, very fine to medium sand, moderately clayey, very pale olive, lime cemented below 254 ft.....	245.0	265.0
Sand, very fine to medium grained, chiefly fine, pale brown, calcareous, calcareous clay streaks at 280 to 285 ft, pale yellow siltstone at 290 to 295 ft.....	265.0	305.0
Sandstone and loose sand, very fine to fine, slightly silty, light yellowish brown, slightly calcareous.....	305.0	315.0
Sand, very fine to medium, with rare sandstone, trace of silt, calcareous, pale yellow.....	315.0	325.0
Sandstone, very fine to fine with calcareous cement, pale brown to white.....	325.0	340.0
Limestone, very pale brown to white, hard, interlayered with white calcareous siltstone and clay, grades into soft pale yellow sandstone, very fine.	340.0	350.0
Siltstone, very pale brown to pale yellow, contains moderate sand and white calcareous sandstone.....	350.0	360.0
Sand, very fine to medium, pale yellow with white calcareous clay seams, slightly silty.....	360.0	370.0
Sandstone and sand, very fine to fine, light yellowish brown, rare rootlets.....	370.0	385.0
Silt, pale yellow, moderately sandy; interlayered with sandstone, very fine to fine, pale yellow....	385.0	390.0
Sandstone and sand, very fine to fine, calcareous cement, few rootlets, pale brown.....	390.0	400.0
Silt, slightly to very sandy, pale yellow.....	400.0	410.0
Sandstone, very fine to fine, pale olive, calcareous cement; trace of pale yellow silt below 420 ft....	410.0	425.0
Sand and sandstone, very fine to medium, pale brown, slightly silty; rootlets at 455 to 460 ft.....	425.0	473.0
Limestone and calcareous cemented sandstone, white..	473.0	475.0
Sandstone, very fine to fine, moderately silty, pale olive, slightly calcareous, below 490 ft interbedded with pale yellow silt; rootlets below 510 ft.....	475.0	525.0
Siltstone, very sandy, very fine to fine, pale yellow, calcareous.....	525.0	530.0
Sandstone, very silty, very fine to medium, pale olive, trace of pale olive siltstone.....	530.0	565.0
Sand and sandstone, very silty, very fine to medium, trace of coarse, very pale olive.....	565.0	570.0
Sand, very fine to fine with trace of medium, very silty; pale olive to very pale brown, some intervals are very sandy silt.....	570.0	590.0
Sand, mostly very fine to fine, very pale brown to pale yellow with trace of dark silicates.....	590.0	600.0

Sand, very fine to fine, trace of medium, moderately silty, pale olive gray with streaks of pale reddish brown, 605 to 610 ft sand becomes medium to coarse, and pale olive with a trace of dark silicates	600.0	611.0
Silt, moderately to very sandy, slightly clayey, sand is very fine to fine, pale yellow; some sandstone below 620 ft	611.0	630.0
Sandstone, moderately silty, very fine to medium, chiefly fine, pale yellow; contains silicified rootlets below 635 ft	630.0	645.0
Siltstone and sandstone, very clayey, very calcareous, pale yellow to white	645.0	655.0
Sandstone, very fine to fine, slightly limy and silty, pale yellow	655.0	665.0
Siltstone and silt, moderately sandy, very fine to fine, limy, very clayey, pale yellow to grayish brown, some sandstone below 670 ft	665.0	695.0
Sand, moderately silty, very fine to fine sand, light gray	695.0	700.0
Sandstone and siltstone, very fine, moderately silty, pale yellow with trace of pink	700.0	720.0
Sand, very fine to very coarse, chiefly very fine to fine, moderately to very silty, pale yellow; below 725 ft contains some very pale brown siltstone; streaks of white clay below 735 ft	720.0	750.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone and silt, very sandy with very fine to fine sand, pale brown; contains scattered lenses of limestone	750.0	800.0

Test Hole #17-B-70 (E-log)
(19N-28W-36ccdd)
Logan County

Location: SE SE SW SW sec. 36, T. 19 N., R. 28 W., on east side of U.S. Highway 83, 78 ft north of section line.
Ground elevation: 2985 ft (t). (Tarbox Lake 7.5 minute quadrangle).
Depth to water: 23.5 ft.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very silty, very fine to fine grained, brown..	0.0	0.4
Sand, slightly silty, very fine to coarse grained, predominantly medium, very pale brown.....	0.4	8.0
Siltstone, moderately clayey, yellowish brown.....	8.0	15.0
Sand, very fine to fine with trace of medium, pale yellow with scattered dark silicates.....	15.0	60.2
Silt, slightly clayey, very sandy with very fine sand, pale yellow.....	60.2	62.8
Sand, very fine to medium, predominantly very fine to fine, pale yellow with scattered dark silicates.....	62.8	65.0
Silt, moderately clayey, very sandy with very fine sand, pale yellow.....	65.0	75.0
Sand, slightly silty, predominantly very fine to fine with some medium, very pale brown with some light olive tint and traces of dark silicates.....	75.0	155.0
Silt, moderately clayey, very sandy, very fine to medium sand, predominantly fine, very pale brown to pale yellow.....	155.0	170.0
Silt, slightly clayey, very sandy with very fine to fine sand, light reddish brown with some light olive.....	170.0	195.0
Sand, slightly clayey, very silty, sand ranges from very fine to very coarse, mostly very fine to fine, trace of fine gravel, pale yellow with some pink and light olive.....	195.0	200.0
Sand, very gravelly and gravel, very sandy, sand is fine to coarse, gravel fine to medium, dominant colors include pink, light gray and white with scattered olive and dark silicates.....	200.0	245.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very clayey, very sandy, very fine to fine sand, pale yellow.....	245.0	256.0
Sandstone, poorly cemented, very fine to medium, rootlets, trace of volcanic ash, pale brown with olive tint.....	256.0	260.0
Sand, silty, very fine to medium, predominantly very fine to fine, very pale brown with some olive tint, trace of rootlets.....	260.0	280.0

Sandstone, poorly consolidated, very fine to fine sand with trace of medium, light brownish gray, rootlets which are replaced by white silica; cement becomes calcareous below 300 ft.....	280.0	320.0
Sandstone, poorly consolidated and sand, very fine to fine, slightly silty, light gray to light brownish gray with some olive tint; rootlets; some volcanic ash and limy areas below 325 ft.....	320.0	330.0
Sand, very fine to medium, pale yellow with some dark silicates.....	330.0	345.0
Sandstone and siltstone; very fine to fine sand, pale yellow, some rootlets.....	345.0	350.0
Sand, very fine to medium, light gray to pale yellow with scattered dark silicates, some slight cementation.....	350.0	360.0
Sandstone, slightly silty, very fine to medium, light gray to pale yellow, calcareous cement.....	360.0	370.0
Sand, with very minor lime cemented sandstone, very fine to coarse with mostly very fine to fine, trace of fine gravel, pale yellow with dark silicates.....	370.0	375.0
Sandstone with lime cement, very fine to medium, light gray to pale yellow.....	375.0	395.0
Silt, moderately clayey, marly, pale yellow.....	395.0	405.0
Silt, moderately clayey, very sandy, very fine to medium, pale yellow.....	405.0	410.0
Sand to sandstone, poorly consolidated, very fine to medium, predominantly fine, pale yellow with scattered dark specks, carbonate cement.....	410.0	425.0
Sand, silty, very fine to fine, pale yellow.....	425.0	440.0
Sandstone, poorly consolidated with lime cement, very fine to medium, pale yellow, trace of rootlets.....	440.0	445.0
Sand, slightly silty, very fine to medium, pale yellow with scattered dark silicate grains.....	445.0	450.0
Sandstone, moderately consolidated, very fine to medium, predominantly fine, pale yellow, trace of lime cement, slightly silty below 455 ft.....	450.0	500.0
Sand, very fine to medium with trace of coarse, pale yellow to pale olive with dark silicates, increase in coarse below 520 ft, trace of fine grained below 525 ft.....	500.0	535.0
Sand, silty, very fine to medium, pale yellow to pale olive, rootlets, trace of very fine gravel from 545 to 555 ft, some dark silicates below 585 ft.....	535.0	620.0
Sand, very fine to coarse and fine gravel, sand about 70 percent, gravel about 30 percent, very pale yellow with some pink and pale olive grains..	620.0	630.0

Sand and sandstone, very fine to very coarse with predominantly medium, pale yellow, trace of fine gravel, trace of rootlets below 645 ft, slightly silty below 650 ft.....	630.0	670.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silty sand to sandy silt, very fine to fine sand, pale yellow.....	670.0	685.0
Silt, very clayey, moderately sandy, pale yellow to very pale brown.....	685.0	700.0

Test Hole #2-S-82 (E-log)
(20N-28W-35ddac)
Logan County

Location: SW NE SE SE sec. 35, T. 20 N., R. 28 W., 650 ft west and 990 ft north of southeast corner of section on shoulder of old highway 88, 13 ft west of the center line.
Ground elevation: 2958 ft (t). (Happy Hollow 7.5 minute quadrangle).
Depth to water: Not recorded.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, moderately silty, pale brown.....	0.0	15.0
Sand, very fine to medium with trace of coarse, pale brown with trace of dark silicates.....	15.0	30.0
Sand, with layers of sandy silt, very fine to medium sand, pale brown to pale yellow with traces of dark silicates; trace of coarse sand 50 to 70 ft..	30.0	80.0
Sand, silty, very fine to fine, very pale brown with traces of dark silicates, traces of calcareous sandstone below 95 ft.....	80.0	100.0
Silt, moderately sandy, slightly clayey, very fine to medium, very pale brown.....	100.0	105.0
Sand, moderately silty, very fine to medium with trace of coarse to very coarse, mostly fine, grayish brown.....	105.0	125.0
Sand and sandstone, moderately silty, very fine to medium, very pale brown with some reddish tint....	125.0	135.0
Silt, slightly sandy with very fine sand, moderately clayey, very pale brown with some reddish brown iron oxide stain.....	135.0	155.0
Sand, very fine to medium with trace of coarse and very coarse, slightly silty, yellowish brown, trace of fine gravel below 160 ft.....	155.0	165.0
Sand, very fine to coarse and gravel, fine, silty, slightly clayey; gravel is dominant below 170 ft; below 195 ft gravel becomes fine to medium with trace of coarse.....	165.0	220.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, sandstone, siltstone and gravel; sand and sandstone, medium grained; gravel, fine to medium, pale olive to pale yellow, trace of pale yellow siltstone.....	220.0	245.0
Gravel, fine to medium and sandstone, very fine to fine, pale yellow to pale brown, calcareous.....	245.0	260.0
Sandstone, fine to medium grained, pale brown with some pale olive and pale yellow; below 265 ft there is scattered fine gravel.....	260.0	270.0

Sandstone and sand, very fine to fine with trace of medium, rootlets, pale brown to greenish gray, 305 to 310 ft mostly sand.....	270.0	315.0
Sand with trace of sandstone, very fine to medium, pale brown, abundant rootlets.....	315.0	355.0
Sandstone and trace of sand, very fine to fine with trace of medium, pale brown to reddish brown and light gray, numerous rootlets, calcareous cement, seed fragments 375 to 385 ft, seams of white clay 400 to 410 ft.....	355.0	420.0
Sandstone, very fine to medium, pale olive brown and siltstone, pale olive, calcareous cement.....	420.0	435.0
Silt, very clayey, limy, slightly sandy with very fine sand, very pale brown.....	435.0	445.0
Sand, very fine to medium and sandstone, poorly cemented, calcareous cement, pale brown; interbedded pale yellow silt below 460 ft; sandstone percentage decreases downward.....	445.0	490.0
Sandstone, very fine to medium, lime cemented, trace of sand, very pale brown, sand increases downward.....	490.0	500.0
Siltstone, pale yellow, very calcareous.....	500.0	505.0
Sand, very fine to medium and sandstone, very fine to fine, pale brown; contains some siltstone, calcareous; some coarse sand 530 to 535 ft.....	505.0	600.0
Sandstone and siltstone, very fine to fine with some claystone, light greenish gray to pale yellow with some olive brown, slightly calcareous, silt and clay increase downward.....	600.0	760.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, very clayey, calcareous, pale yellow to reddish brown.....	760.0	800.0